

wherein said ceramic substrate contains 0.1 to 20% by weight of an oxide as a sintering aid.

⁹21. (New) The ceramic heater for a semiconductor-producing/examining device according to Claim ~~13~~¹,

wherein said ceramic substrate has a diameter of 300 mm or more.

¹⁰~~22~~. (New) The ceramic heater for a semiconductor-producing/examining device according to Claim ~~13~~¹,

wherein said ceramic substrate comprises an electrostatic electrode.

REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 13-22 are presently pending in this application, Claims 1-12 having been canceled and Claims 13-22 having been added by the present Amendment.

In the outstanding Office Action, Claims 1-4 and 6 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-74064 (JP '064) in view of JP 9-283607 (JP '607) and JP 7-326655 (JP '655); Claims 1-4 and 6-11 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '655 or JP '607 each in view of either applicants' acknowledged state of art or JP '064; and Claims 5 and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '064 in view of JP '607 and JP '655 each in view of either applicants' acknowledged state of the art of the JP '064 as applied to claims 1-4 and 6-11 above, and further in view of either JP 11-40330 (JP '330) or Bunkert et al. (U.S. Patent 5,656,093).

New Claims 13-22 find clear support in the original specification, claims and drawings. For example, Claim 13 is supported by the originally filed claims and at lines 7 to

10 on page 1 in the specification. Claim 14 is supported by the originally filed claims. Claim 15 is supported by the originally filed claims. Claim 16 is supported by the originally filed claims. Claim 17 is supported at lines 4 to 5 on page 10 in the specification. Claim 18 is supported at lines 17 to 18 on page 11 in the specification. Claim 19 is supported at lines 17 to 18 on page 11 in the specification. Claim 20 is supported at lines 20 to 21 on page 11 in the specification. Claim 21 is supported by Examples 2, 3, 5 and 6. Claim 22 is supported by Fig. 1 and at lines 27 to 30 on page 12 in the specification. Hence, Claims 13-22 are not believed to raise a question of new matter.

Briefly recapitulating, Claim 13 is directed to a ceramic heater for a semiconductor-producing/examining device. For example, referring to the non-limiting embodiment of Figs. 1 and 2, the ceramic heater includes a ceramic substrate 1 and a conductor (2, 3) formed on a surface of the ceramic substrate or inside the ceramic substrate. The ceramic substrate 1 includes a nitride ceramic or a carbide ceramic, and oxygen. The ceramic substrate 1 has a disc form. The diameter of the ceramic substrate exceeds 250 mm and a thickness of the ceramic substrate is 25 mm or less.

If the ceramic substrate has a large warp amount, a semiconductor wafer cannot be heated uniformly. The reason is that the ceramic substrate and the semiconductor wafer do not closely contact with each other or that the distance between the surface of the ceramic substrate and the surface of the semiconductor wafer is uneven.

In the conventional ceramic substrate which is formed from a nitride ceramic or a carbide ceramic and which has a diameter exceeding 250 mm and a thickness of 25 mm or less, a warp tends to be generated at a temperature of 100°C or higher.

In the present invention recited in Claim 13, the ceramic substrate which is made from a nitride ceramic or a carbide ceramic contains oxygen. By adding oxygen to the ceramic

substrate, the sinterability of the ceramic substrate improves. Accordingly, the barrier of heat conduction between ceramic particles of the ceramic substrate lowers, and so the warp amount of the substrate at a temperature of 100°C or higher is reduced.¹ The ceramic heater according to the present invention recited in Claim 13 can thus realize a uniform heating of a wafer.

This effect is understood by comparing Examples and Test examples as shown in Table 1 in the present specification. The warp amount of the substrates in Examples 1 to 3, wherein the oxygen content of the ceramic substrates is 1.6% by weight, is 5 to 10 μm at 450°C. On the other hand, the warp amount of the substrate in Test example 3, wherein the oxygen content of the ceramic substrates is less than 0.05% by weight, is as large as 30 μm . Further, in Test example 1, the warp amount of the substrate with a diameter of 240 mm is 10 μm . This example, wherein the diameter of the substrate is below 250 mm, does not pose the problem of warp generation at a high temperature.

JP '064 discloses a wafer heating device having a ceramic substrate comprising a nitride ceramic such as AlN. However, JP '064 fails to suggest or teach that the ceramic substrate contains oxygen. For example, the AlN ceramic substrate in Example 1 disclosed in the JP '064 reference has a purity of 99.9%. Such a substrate cannot suppress the generation of a warp. In fact, JP '064 is silent about a warp generation in a ceramic substrate. Therefore, the ceramic substrate according to the present invention is different in constitution from the ceramic substrate disclosed in JP '064. Moreover, the effect of the present invention is not disclosed in JP '064. Thus, JP '064 is not believed in any way to obviate the invention recited in Claim 13.

¹The present specification, page 2, lines 14-18.

JP '607 discloses an electrostatic chuck including a sintered body which contains aluminum oxide and silicon carbide. The sintered body has a diameter of 195 mm and a thickness of 4 mm (see Example 1). The object of the present invention recited in Claim 13 is to solve the problems of a large ceramic substrate having a diameter exceeding 250 mm. Therefore, JP '607 is not believed in any way to obviate the invention recited in Claim 13.

JP '655 discloses an electrostatic chuck including an aluminum nitride sintered body, an insulating layer and a heat generating circuit. The insulating layer, wherein aluminum nitride is used as the main body, contains 20% by atom or less of oxygen. The sintered body has a thickness of about 5 mm (see [0029]), however, its diameter is not described. Therefore, one cannot envisage from JP '655 the problem of a warp generated at a high temperature in a ceramic substrate having a diameter exceeding 250 mm. Accordingly, JP '655 is not believed in any way to obviate the invention recited in Claim 13.

All of these prior arts are silent about a warp generated in a large ceramic substrate. None of the applied references provides the motivation to modify the JP '064 reference or the JP '607 and JP '655 references so as to arrive at Applicants' claimed invention.² In rejecting a claim under 35 U.S.C. §103(a), the USPTO must support its rejection by "substantial evidence" within the record.³ There is no substantial evidence within the record of

² See MPEP 2143.01 stating "[o]bviousness can only be established by combining or modifying the teaching of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art," (citations omitted). See also MPEP 2144.08 III stating that "[e]xplicit findings on motivation or suggestion to select the claimed invention should also be articulated in order to support a 35 U.S.C. 103 ground of rejection. . . . Conclusory statements of similarity or motivation, without any articulated rational or evidentiary support, do not constitute sufficient factual findings."

³ In re Gartside, 203 F3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000) (holding that, consistent with the Administrative Procedure Act at 5 USC 706(e), the CAFC reviews the Board's decisions based on factfindings, such as 35 U.S.C. §103(a) rejections, using the 'substantial evidence' standard because these decisions are confined to the factual record

motivation for modifying the JP '064 reference or the JP '607 and JP '655 references so as to obtain Applicants' claimed invention. Therefore, a person of ordinary skill in the art would not have been motivated and would not have found it obvious to perform such modification, and Claim 13 is believed to be non-obvious and patentable over the applied prior art. Consequently, Claim 13 is believed to be non-obvious over the cited references. Therefore, Claim 13 is believed to be allowable.

Substantially the same arguments as set forth above with regard to Claim 13 also apply to dependent Claims 14-22, which dependent directly from Claim 13. Accordingly, each of the dependent claims is also believed to be allowable.

Further, JP '330 discloses a ceramic heater including a heater plate of a nitride ceramic or a carbide ceramic. The heater plate has a diameter of 230 mm, and a thickness of 5 mm or less ([0012], [0029]). However, JP '330 fails to teach about a ceramic plate having a diameter exceeding 250 mm, and problems attributable to such a large ceramic plate. Therefore, the ceramic substrate according to the present invention is different in constitution from the ceramic plate disclosed in JP '330. Moreover, the effect of the present invention is not described in JP '330. Thus, JP '330 is not believed in any way to obviate the invention recited in Claim 15.

Burkhart et al. disclose a wafer spacing mask deposited upon the support surface of the chuck. It mentions about a ceramic chuck body, however, is silent about the diameter and the thickness thereof. Moreover, it fails to teach that a warp amount of the ceramic body at a high temperature can be reduced by incorporating oxygen in the ceramic body and thereby a uniform heating is realized. Therefore, the effect of the present invention is not disclosed in

compiled by the Board.)

Burkhart et al. In the first place, Burkhart et al. do not disclose a ceramic heater. Thus, Burkhart et al. are not believed in any way to obviate the invention recited in Claim 15.

There is no substantial evidence within the record of motivation for modifying the JP '064 reference or the JP '607 and JP '655 references so as to obtain Applicants' claimed invention. Therefore, a person of ordinary skill in the art would not have been motivated and would not have found it obvious to perform such modification, and Claim 15 is believed to be non-obvious and patentable over the applied prior art.

Consequently, in view of the present amendment, it is respectfully submitted that this application is in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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IN THE CLAIMS

Please cancel Claims 1-12 without prejudice and add new Claims 13-22 as follows:

--1-12. (Canceled)

13-22. (New)--